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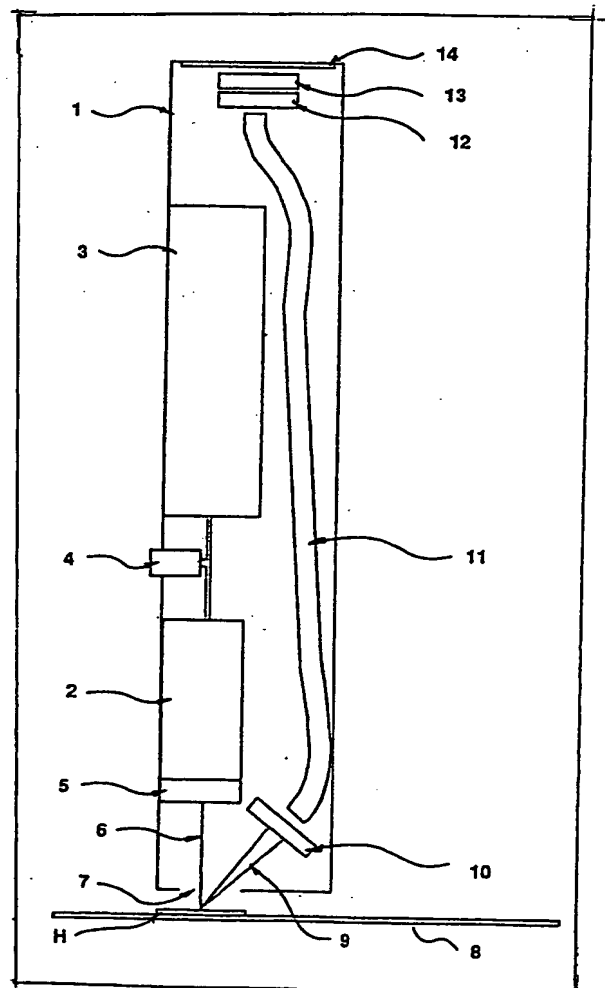
(56) Documents cited  
GB 2248943 A GB 1541918 A  
Applied Optics, Vol. 31, No. 8, 10 March 1992,  
pages 1048-1052.

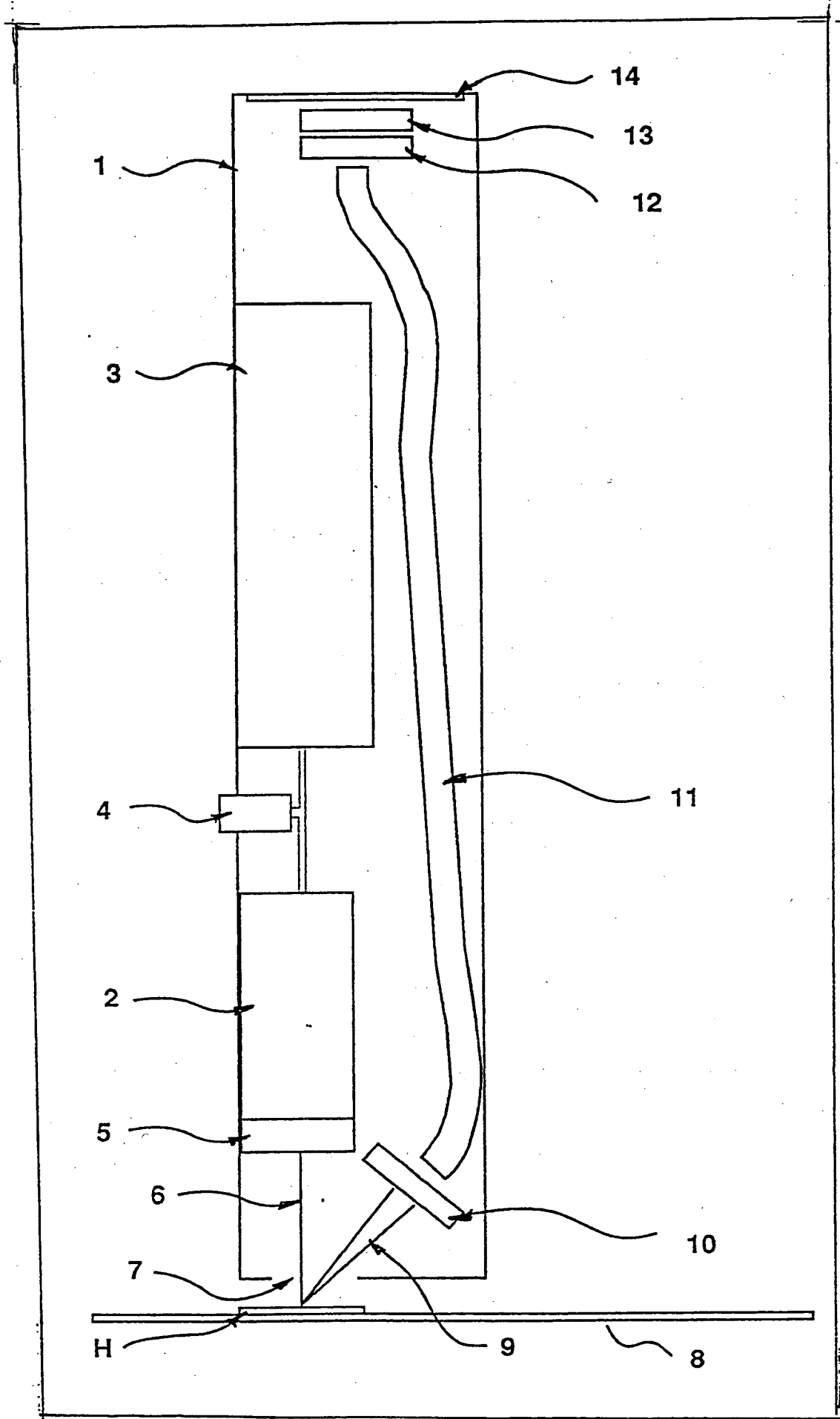
(58) Field of search  
UK CL (Edition L) G2J J33BX  
INT CL<sup>5</sup> G03H

(54) Compact, hand-held reader for evaluating optical diffractive information

(57) A compact, hand-held, portable reader in the form of a pen-like body 1 for reading and presenting to an operator for evaluation encoded information recorded and encoded within a single optical diffractive element or a plurality of such elements, preferably a hologram(s) H, bonded to or integrated with the particular control device to be evaluated, for the purpose of authenticating or validating e.g. passports, seals, credit cards, cheques, currency, negotiable securities, tickets and security passes, comprises a laser diode 2, lens systems 5, 10, 13, optic fibre bundle 11, optical decoder 12 e.g. a hologram, and imaging screen 14.

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Eing.: 08. MAI 2002		
PA. Dr. Peter Riebling		
Bearb.:	Vorgelegt.	





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**COMPACT OPTICAL READER FOR EVALUATING ENCODED INFORMATION**

**This invention relates to a compact, hand-held device for reading and evaluating encoded information.**

**The requirements of modern commerce have made necessary the multiplication and diversity of control methods such as cards for the operation of cash dispensers, door and safelocks, authentication of credit cards, passports and air tickets and other purposes described below.**

**In particular, light diffracting microstructure devices, such as diffraction gratings, kinoforms, kinograms and holograms, when bonded to or integrated with such cards or materials mentioned above, afford such materials an increased level of security by way of their resistance to forgery. The prior art, for example, EP 77464, EP 420261 describes such optical diffractive devices containing machine readable information and the devices for reading them, for example EP 77917, DE 2747156, GB 1561812, DE 2508889, DE 3840037.**

**This multiplication of such control devices has itself given rise to ever-increasing forgery of them and the object of the present invention is to provide a method of improved convenience for monitoring the control devices in order to evaluate them and determine their authenticity.**

According to the present invention there is provided a portable, hand-held compact reader capable of reading encoded information recorded and encoded within a single optical diffractive element or a plurality of such elements, preferably a hologram or holograms, bonded to or integrated with the particular control device to be evaluated. There is provided within the present invention a novel method which improves the compactness of such readers as described in the prior art so as to allow the device to be held in the hand like a pen or wand, thus affording the device improved ease of use by the operator.

The encoded information to be evaluated is invisible or covert until rendered visible to the operator by the present invention. The encoded information may be further encyphered by optically modulating or optically scrambling it at the recording or encoding stage. There is provided within the present invention an optical decoder for decyphering such information, thus affording suitably encoded information, the added protection and security of being unique to the reader device.

The present invention is exemplified in the accompanying drawing, which shows a prototype apparatus in the form of an optical reader for checking the presence or absence of security encoded information in an optical diffractive device, exemplified here by hologram H which is provided on a carrier 8, which carrier for example could be in the form

of a credit card.

The reader comprises a housing 1 shaped like a pen or small torch, enclosing a laser diode 2 powered by power supply 3 in the form of rechargeable batteries or an external source (not shown).

When switched on by pushbutton switch 4 radiation is emitted from the laser 2 and is modulated by lens system 5 to emerge through aperture 7 which is positioned over the hologram H so that the radiation following beam path 6 is allowed to impinge on hologram H.

A sensor and indicator system (not shown) may be arranged within the reader to confirm correct location of the hologram H relative to beam path 6.

The diffracted laser radiation 9 emerging from hologram H is modulated by lens system 10 and is caused to fall onto the surface of the coherent optical fibre bundle 11. The radiation travels along the fibre bundle 11 to emerge before the optical decoder 12. The decoded radiation emerges from the decoder 12 and is further modulated by lens system 13 which causes a focussed image to appear on the imaging screen 14. The operator is then able to evaluate the decoded information presented on the screen.

The imaging screen is preferentially a clear glass or plastic diffuser which may be coloured or coated with anti-reflection layers to enhance the contrast of the image.

The optical decoder is preferably a hologram, but may be some other optical device for modulating radiation. The optical decoder 12 is interchangeable with other similar optical decoders, which differ only

in their recognition of certain patterns of modulated radiation. Each optical decoder corresponds uniquely to an encyphered and encoded optical diffractive element represented here by hologram H.

The coherent optical fibre bundle 11 comprises a tube, which may be flexible, housing a multitude of parallel alike glass fibres of fixed length with polished faces at each end. The fibres may be fused together forming a continuous glass medium. In a more basic form the coherent optial fibre bundle may be replaced by a pre-distorted glass or plastic rod displaying similar but usually inferior characteristics to the coherent optical fibre bundle.

**CLAIMS**

**1** A compact, hand-held, portable device in the form of a pen-like body capable of reading and presenting to the operator encoded information recorded and encoded within a single optical diffractive element or a plurality of such elements, preferably a hologram or holograms, bonded to or integrated with the particular control device to be evaluated, for the purpose of authenticating or validating items of value including passports, seals, credit cards, cheques, currency, negotiable securities, tickets and other valuable documents as well as control systems including security passes.

**2** A compact optical reader as claimed in Claim 1, wherein its unique compactness is achieved by the novel method of employing a flexible coherent optical fibre bundle to transfer the radiation containing the information to be evaluated.

**3** A compact optical reader as claimed in Claim 1, wherein its unique compactness is achieved alternatively to the claim in Claim 2, by the novel method of employing a rigid coherent optical fibre bundle to transfer the radiation containing the information to be evaluated.

**4** A compact optical reader as claimed in Claim 1, wherein its unique compactness is achieved alternatively to the claim in Claim 3, by the novel method of employing a flexible glass or plastic rod to transfer the radiation containing the information to be evaluated.

**5** A compact optical reader as claimed in Claim 1, wherein its

unique compactness is achieved alternatively to the claim in Claim 4, by the novel method of employing a rigid glass or plastic rod to transfer the radiation containing the information to be evaluated.

6 A compact optical reader as claimed in any preceding Claim, wherein the information to be evaluated is presented to the operator by means of a viewing screen coloured to enhance the contrast of the image.

7 A compact optical reader as claimed in Claim 6, wherein the information to be evaluated is presented to the operator by means of a viewing screen coated with anti-reflection materials to enhance the contrast of the image.

8 A compact optical reader as claimed in any preceding Claim, which reads and decodes information holographically encoded.

9 A compact optical reader as claimed in Claim 8, wherein means of power supply is provided by rechargeable batteries contained within the device.

10 A compact optical reader as claimed in Claim 9, wherein means of coherent electromagnetic radiation is provided by a compact laser diode.

11 A compact optical reader substantially as described herein with reference to the accompanying drawing.

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**Patents Act 1977**  
**Examiner's report to the Comptroller under**  
**Section 17 (The Search Report)**

Application number

GB 9210272.2

**Relevant Technical fields**

(i) UK Cl (Edition L ) G2J (J33BX)

(ii) Int Cl (Edition 5 ) G03H

**Search Examiner**

MR C J ROSS

**Databases (see over)**

(i) UK Patent Office

(ii)

**Date of Search**

10 MAY 1993

Documents considered relevant following a search in respect of claims

1-11

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2248943 A (LIGHT FANTASTIC)	1 at least
X	GB 1541918 (SIEMENS)	1 at least
X	Applied Optics, Vol 31, No 8, 10 March 1992, pages 1048-1052  J Upatnieks "Edge illuminated holograms" - see especially Figures 5, 7	1 at least

Category	Identity of document and relevant passages	Relevant to claim(s)

### Categories of documents

**X:** Document indicating lack of novelty or of inventive step.

**Y:** Document indicating lack of inventive step if combined with one or more other documents of the same category.

**A:** Document indicating technological background and/or state of the art.

**P:** Document published on or after the declared priority date but before the filing date of the present application.

**E:** Patent document published on or after, but with priority date earlier than, the filing date of the present application.

**&:** Member of the same patent family, corresponding document.

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